AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT	1. CONTRACT ID CODE	PAGE 1 OF PAGES 3

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (*If applicable*)
001			

6. ISSUED BY CODE	7. ADMINISTERED BY (*If other than Item 6*) CODE
U. S. Department of Energy, National Energy Technology Laboratory P.O. Box 880, Attn: D. Denise Riggi 3610 Collins Ferry Road Morgantown, WV 26507-0880	

8. NAME AND ADDRESS OF CONTRACTOR (*No., street, county, State, and ZIP Code*)	(✓)	9A. AMENDMENT OF SOLICITATION NO.
To Be Determined		DE-RP26-00NT40768
	X	9B. DATED (*See Item 11*) April 12, 2000
		10A. MODIFICATION OF CONTRACT/ORDER NO.
CODE / FACILITY CODE		10B. DATED (*See Item 13*)

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

□ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers □ is extended, ☒ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (*If required*)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(✓)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (*Specify authority*) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (*such as changes in paying office, appropriation date, etc.*) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (*Specify type of modification and authority*)

E. IMPORTANT: Contractor □ is not, □ is required to sign this document and return ___ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (*Organized by UCF section headings, including solicitation/contract subject matter where feasible.*)

The purpose of this amendment is to provide answers to questions submitted regarding the subject solicitation. The following pages contain the questions and DOE's responses. None of the requirements, terms or conditions of the solicitation are affected by this amendment.

Q represents the questions posed, and **R** represents the DOE's response.

See continuation pages.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (*Type or print*)		16A. NAME AND TITLE OF CONTRACTING OFFICER (*Type or print*) Raymond R. Jarr	
15B. CONTRACTOR/OFFEROR (*Signature of person authorized to sign*)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY // original signed by Raymond R. Jarr // (*Signature of Contracting Officer*)	16C. DATE SIGNED 05/10/00

Q1 Should one propose a unique monitor for airborne and surface beryllium, or would you consider a different monitor for each application?

R1 Please notice that the solicitation continually refers to “monitor(s),” indicating that DOE anticipates the receipt of offers proposing a single monitor for measurement of both airborne and surface beryllium, and offers proposing individual (or two) monitors for measurement of airborne and surface beryllium.

Q2 On page 26 of the RFP, it says: “Rocky Flats currently spends approximately $22 per sample. This price must be reduced if real-time surface characterization is to be used on-site.” Are the $22 per sample the cost of analysis or the cost of collecting a sample? Also, how many samples do these facilities have to collect per day or month?

R2 The $22 figure is an estimate of off-site lab analytical work. For airborne monitoring, when the monitor is used for an alarm function in conjunction with decontamination and decommissioning activities, the monitor would likely be used in a continuous manner, taking readings as rapidly as possible. For surface beryllium measurements, the amount of material being characterized for free release will drive the frequency of measurements that are required. A "worst-case" scenario is that beryllium surface monitors would be in continual use during dismantlement activities to maximize the throughput of material to be free-released.

Q3 Is it possible to have a collaboration between a university that will do part of the research work and a starting small business that will build a prototype?

R3 Absolutely. There are no restrictions regarding offers from teams comprised of educational institutions and small businesses.

Q4 The RFP refers to “real time monitors for near-instantaneous detection and measurement of airborne and surface beryllium contamination.” Can you quantify the goal relative to “near-instantaneous;” is this once per minute, per hour, per day?

R4 “What is real-time" will be measurement "turn-around time" of 15 minutes or less.

Q5 The RFP indicates that “Federal agencies and agents are prohibited from participating at any level in proposals submitted in response to this solicitation.” Does this preclude licensing technology (for a fee) from a national laboratory such as Argonne National Laboratory?

R5 Licensing a technology from a National Lab for further development under a government funded contract is acceptable. However, the Government has a royalty-free license for any patent owned by a National Laboratory, so royalty costs will not be considered an allowable cost under any award made pursuant to this solicitation.

Q6 Please provide a list of references regarding this past work.

R6 See Attachment A.

1. EM Task 13 -- Cone penetrometer for subsurface heavy metals detection. Semi-annual report, April 1--September 30, 1997. Order Number DE98054539 DOE Contract FC21-94MC31388. Order Number DE98054539. Source: OSTI; NTIS; GPO Dep.

Surface and subsurface contamination of soils by heavy metals, including Pb, Cr, Cu, Zn, and Cd has become an area of concern for many industrial and government organizations. Conventional sampling and analysis techniques for soil provide a high degree of sensitivity and selectivity for individual analytes. However, obtaining a representative sampling and analysis from a particular site using conventional techniques is time-consuming and costly. Additionally, conventional methods are difficult to implement in the field for in situ and/or real-time applications. Therefore, there is a need for characterization and monitoring techniques for heavy metals in soils which allow cost-effective, rapid, in situ measurements. Laser induced breakdown spectroscopy (LIBS) has been used to successfully measure metals content in a variety of matrices including soil. Science and Engineering Associates (SEA) is developing a subsurface cone penetrometer (CPT) probe for heavy metal detection that employs LIBS. The LIBS/CPT unit is to be applied to in situ, real-time sampling and analysis of heavy metals in soil. The overall objectives of this project are to evaluate potential calibration techniques for the LIBS/CPT instrument and to provide a preliminary evaluation of the LIBS instrument calibration using samples obtained from the field.

2. Interim Progress Report DE-FG07-96ER62305, *A Fundamental Study of Laser-Induced Breakdown Spectroscopy Using Fiber Optics for Remote Measurements of Trace Metals,* **Scott R Goode and S. Michael Angel, 16p.** Short abstract: The long-term goal of this project is to develop a system to measure the elemental composition of unprepared samples using laser-induced breakdown spectroscopy, LIBS, with a fiber-optic probe.

3. "Detection of Metals in the Environment Using a Portable Laser-Induced Breakdown Spectroscopy Instrument", Cremers, et.al., Applied Spectroscopy, Volume 50, Number 2, 1996.

4. "Transportable laser-induced breaksown spectroscopy (LIBS) instrument for Field-based soil analysis", Cremers, D.A., et.al., SPIE Volume 2835, page 190, 1996.

5. (LA-UR--94-1544) " RCRA materials analysis by laser-induced breakdown spectroscopy: Detection limits in soils." Koskelo, A.; **Cremers**, D.A. Los Alamos National Lab., NM (United States). [1994]. 64p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE94018613. Source: OSTI; NTIS; INIS; GPO Dep.

The goal of the Technical Task Plan (TTP) that this report supports is research, development, testing and evaluation of a portable analyzer for RCRA and other metals. The instrumentation to be built will be used for field-screening of soils. Data quality is expected to be suitable for this purpose. The data presented in this report were acquired to demonstrate the detection limits for **laser**-induced breakdown **spectroscopy** (LIBS) of soils using instrument parameters suitable for fieldable instrumentation. The data are not expected to be the best achievable with the high pulse energies available in laboratory lasers. The report presents work to date on the detection limits for several elements in soils using LIBS. The elements targeted in the Technical Task Plan are antimony, arsenic, beryllium, cadmium, chromium, lead, selenium, and zirconium. Data for these

elements are presented in this report. Also included are other data of interest to potential customers for the portable LIBS apparatus. These data are for barium, mercury, cesium and strontium. Data for uranium and thorium will be acquired during the tasks geared toward mixed waste characterization.

6. Cremers, D.A., R.C. Chinni, A.E. Pichahchy, and H.K. Thornquist, "Enhancing the Analytical Performance of Laser-Induced Breakdown Spectroscopy", Report LA-UR-98-3689, 17p.

7. Hahn, D.W; Flower, W.L; Hencken, K.R., "Discrete particle detection and metal emissions monitoring using laser-induced breakdown spectroscopy," Applied Spectroscopy, Dec 31 1997, ISSN 0003-7028, No. 51, Volume 12, pp. 1836-1844.

The unique conditions for the application of laser-induced breakdown spectroscopy (LIBS) as a metal emissions monitoring technology have been discussed. Because of the discrete, particulate nature of effluent metals, the utilization of LIBS is considered in part as a statistical sampling problem involving the finite laser-induced plasma volume, as well as the concentration and size distribution of the target metal species. Particle sampling rates are evaluated and Monte Carlo simulations are presented for relevant LIBS parameters and wastestream conditions. For low metal effluent levels and submicrometer-sized particles, a LIBS-based technique may become sample limited. An approach based on random LIBS sampling and the conditional analysis of the resulting data is proposed as a means to enhance the LIBS sensitivity in actual wastestreams. Monte Carlo simulations and experimental results from a pyrolytic waste processing facility are presented, which demonstrate that a significant enhancement of LIBS performance, greater than an order of magnitude, may be realized by taking advantage of the discrete particulate nature of metals. {copyright} {ital 1997} {ital Society for Applied Spectroscopy}.

8. The following report discusses the airborne Be monitor, published by LLNL. The report number is UCRL-JC-123854, "Quantification Evaluation of Real-Time Berylium Air Monitoring Using Laser-Induced Breakdown Spectroscopy," N. Vahdat, etal.